

Commercial NOxTECH Demonstration in a Coal-Fired Utility Boiler

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Summary

NOxTECH, Inc. of Irvine, California has developed an alternative approach to reducing NOx emissions from utility coal-fired boilers. Unlike Selective Non-Catalytic Reduction (SNCR) systems where different injection levels are needed to feed the chemical reagent into the boiler at hopefully the right temperature, the NOxTECH system uses a single-level injection grid. This grid injects fuel and chemical to control the flue gas temperature at an optimum temperature for NOx reduction throughout the load range. Based on current projections, the NOxTECH system can reduce NOx emissions below 0.10 lbm NO₂/MBtu, without catalytic surfaces, at approximately the same capital and operating cost of an SNCR system.

The NOxTECH process uses gas-phase reactions to reduce NOx in the temperature range of 1400 to 1550°F. A unique fuel and chemical injection grid is located between tube banks in the convective pass. The NOxTECH system controls temperature optimally for gas-phase NOx reduction. Using no catalytic surfaces, only 0.2 seconds of residence time is needed in existing boiler cavities to reduce NOx by 95% or more, and NH₃ slip does not exceed 2 ppm.

A NOxTECH NOx reduction system was installed on a 2.8 MW diesel electric generator at the Pebbly Beach Generating Station of Southern California Edison Company in 1995. Over the last three (3) years, it has reduced NOx emissions by 90 percent. The South Coast Air Quality Management District ruled that NOxTECH's NOx reduction technology was BACT for diesel electric generators and issued the operating permit for the major new emissions source.

NOxTECH is planning to prepare a detailed design of a utility-scale system for coal-fired boilers. The design will include process and fabrication drawings as well as installation plans for demonstrating the NOxTECH system on a 50 to 100 MW coal-fired boiler. The engineering design will provide a detailed description and explanation of all safety interlocks with the boiler controls. The management system for the fuel injection will incorporate a complete control logic for startup and shutdown as well as normal operations with boiler load variations.

NOxTECH also plans to conduct a demonstration test of the technology. The project will demonstrate control of NOx emissions below 0.10 lbm NO₂/MBtu at less than 2 ppm NH₃ slip without using solid catalysts. The demonstration will also document thermal efficiency and ash quality improvements due to implementation of the unique NOxTECH combustion system.